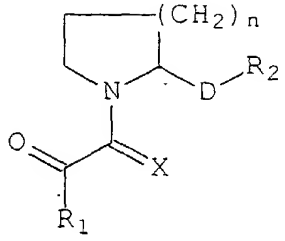
What is claimed is:

1. A compound having the formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is a carboxylic acid or a carboxylic acid isostere; and

wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, heterocycle, or carboxylic acid isostere is optionally substituted with one or more substituents selected from R^3 and Z, where

R^3 and Z are independently hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, or CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate

thereof;

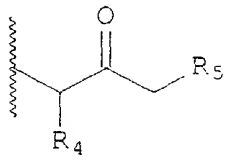
provided that:

when n=1, and D is a bond, and R_2 is COOH,

then R_1 is not C_1-C_9 straight or branched chain alkyl, C_2-C_9 straight or branched chain alkenyl, C_5-C_7 cycloalkyl, C_5-C_7 cycloalkenyl, phenylamine, 2-(3,4-dichlorophenyl)ethyl, hydroxy, ethoxy, benzyl, or Ar_1, where Ar_1 is 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 1-pyridyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, and wherein said alkyl, alkenyl, cycloalkyl, cycloalkenyl, or Ar_1 are optionally substituted with one or more substituents selected from the group consisting of hydrogen, halo, hydroxyl, nitro, trifluoromethyl, C_1-C_9 straight or branched alkyl, C_2-C_9 straight or branched alkenyl, C_1-C_4 alkoxy, C_2-C_4 alkenyloxy, phenoxy, benzyloxy, COOH, and amino;

further provided that:

when n=1, and D is a bond, and R_2 is the carboxylic acid isostere -CONZ(R^3), and Z is hydrogen or C_1-C_6 alkyl, and R^3 is phenyl, or C_2-C_6 straight or branched chain alkyl or alkenyl, wherein said alkyl is unsubstituted or substituted in one or more positions with Ar_2 as defined below, C_3-C_8 cycloalkyl, cycloalkyl connected by methyl or a C_2-C_6 straight or branched chain alkyl or alkenyl chain, C_1-C_4 alkyl ester, or Ar_3 where Ar_3 is selected from the group consisting of 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thiazolyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents independently selected from the group consisting of hydrogen, halo, hydroxy, nitro, trifluoromethyl, C_1-C_6 straight or branched alkyl, C_2-C_6 straight or branched alkenyl, C_1-C_4 alkoxy, C_2-C_4 alkenyloxy, phenoxy, benzyloxy, and amino; wherein said alkyl ester is optionally substituted with phenyl; or R^3 is the fragment:



where R_4 is selected from the group consisting of straight or branched chain C_1-C_8 alkyl optionally substituted with C_3-C_8 cycloalkyl, benzyl, or Ar_2 as defined below, and where R_2 is COOZ or $CONR^6$, where R^6 is selected from the group consisting of hydrogen, C_1-C_6 straight or branched alkyl, and C_2-C_6 straight or branched alkenyl, and where R_5 is selected from the group consisting of phenyl, benzyl, C_1-C_6 straight or branched alkyl, and C_2-C_6 straight or branched alkenyl, where said alkyl or alkenyl is optionally substituted with phenyl; then R_1 is not C_1-C_9 straight or branched chain alkyl, C_2-C_9 straight or branched chain alkenyl, substituted thiophene, or C_1-C_4 alkoxy, wherein said alkyl or alkenyl is optionally substituted in one or more positions with C_3-C_8 cycloalkyl, C_5-C_7 cycloalkenyl, or Ar_2, where Ar_2 is defined below, where said alkyl, alkenyl, cycloalkyl or cycloalkenyl groups may be optionally substituted with C_1-C_4 alkyl, C_1-C_4 alkenyl, or hydroxy, and where Ar_2 is 1-naphthyl, 2-naphthyl, 2-indolyl, 3-indolyl, 2-furyl, 3-furyl, 2-thienyl, 3-thienyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, or phenyl, having one to three substituents selected from the group consisting of hydrogen, halo, hydroxy, nitro, trifluoromethyl, C_1-C_6 straight or branched alkyl, C_2-C_6 straight or branched alkenyl, C_1-C_4 alkoxy, C_2-C_4 alkenyloxy, phenoxy, benzyloxy, and amino;

further provided that:

when n=1, and X is O, and D is a bond, and R_2 is $-CONH_2$, then R_1 is not methyl, ethyl, iso-propyl, iso-butyl, iso-pentyl, 4-methylpentyl, indolyl, phenyl, or hydroxyphenyl;

further provided that:

when n=1, and X is O, and D is a bond, and R_2 is cyano, then R_1 is not methyl;

further provided that:

when n=2, and X is O, and D is a bond, and R_2 is $CONZ(R^3)$, and R_1 is ethoxy, then R^3 or Z is not halo-substituted phenyl;

further provided that:

when n=2, and X is O, and D is a bond, and R_2 is $CONZ(R^3)$ and R_1 is substituted thiophene or tetrahydropyranoxy, or methoxy, then R^3 or Z is not C_1-C_4 alkyl ester substituted ethyl;

further provided that:

when n=2, and X is O, and D is a bond, and R_2 is $CONZ(R^3)$ and R_1 is ethoxy, then R^3 or Z is not 4-chlorophenyl;

further provided that:

when n=2, and X is O, and D is a bond, and R_2 is $CONZ(R^3)$ and R_1 is cyclohexyl, then R^3 or Z is not ethyl or propyl substituted with phenyl;

further provided that:

when D is CH_2, then R_2 is not -OMe, -NHMe, or substituted -NHcyclohexyl;

further provided that:

when D is CH_2, and R_2 is -OH,

then R_1 is not phenyl or pyrrolidinemethanol;

further provided that:

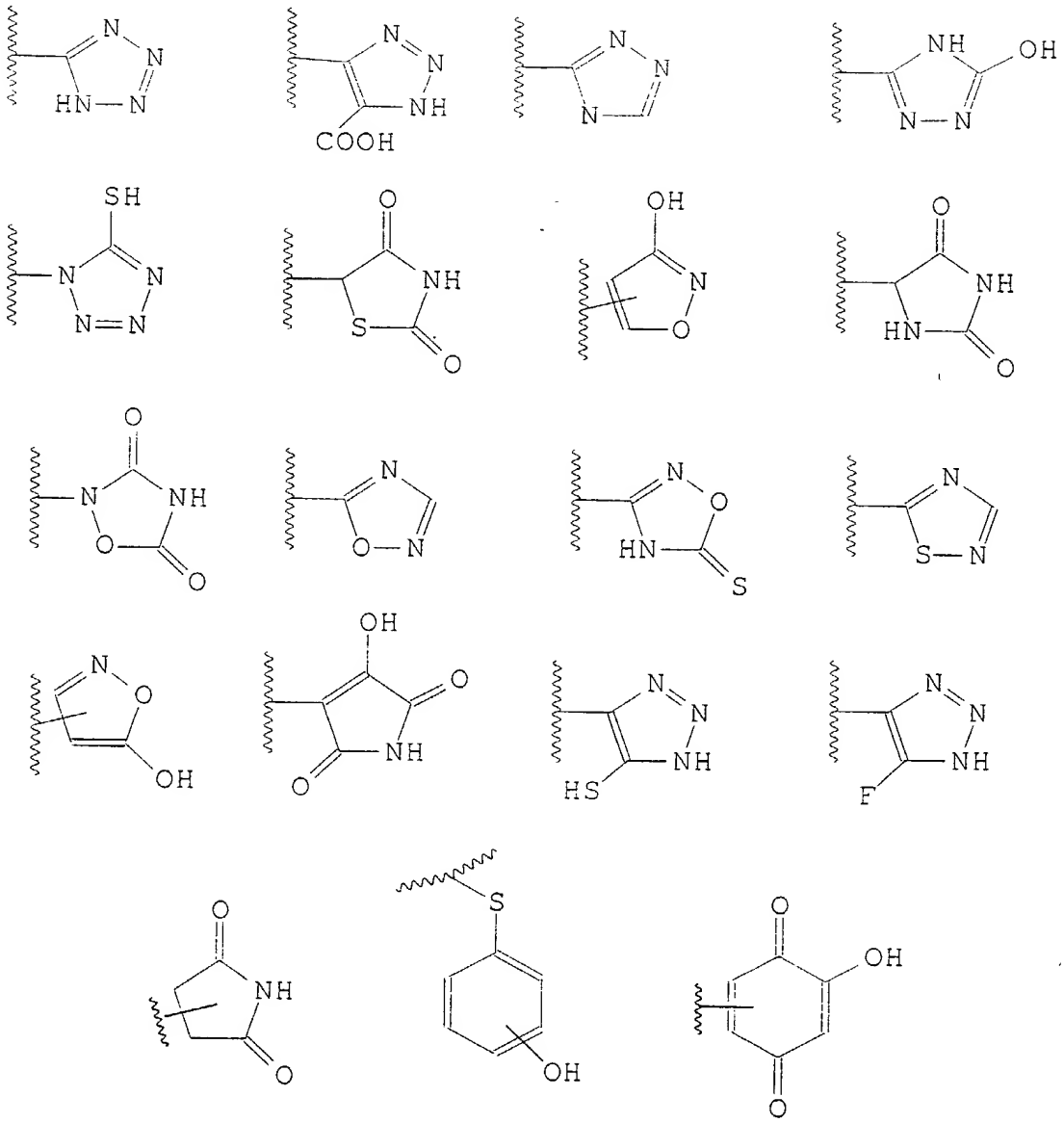
when n=2, and X is O, and D is a bond, and R_2 is COOH,

then R_1 is not methyl, tert-butyl, 1,1-dimethyl-2-methyl-propyl, 1,1-dimethyl-propyl, methoxy, ethoxy, phenyl, tetrahydropyranoxy substituted C_4-C_6 alkyl, 1-methyl-1-methoxyamide, 1-methylcyclohexyl, 3-iodophenyl, 3-methyl ester-cyclopentyl, 1,1-dimethyl-6-phenyl-hex-3,5-dioxy, or trimethoxyphenyl.

2. The compound of claim 1, wherein R_2 is a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in

any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

3. The compound of claim 1, wherein R_2 is selected from the group consisting of:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

4. The compound of claim 1, wherein R_2 is selected from the group consisting of:
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_3(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CONZ(R^3)$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$.

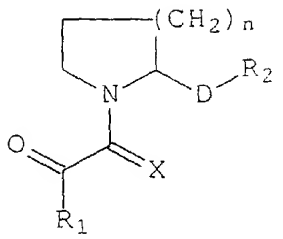
5. The compounds, (2S)-1-(1,2-dioxo-3,3-dimethylpentyl)-2-hydroxymethylpyrrolidine; (2S)-1-(1,2-dioxo-3,3-dimethyl pentyl)-2-pyrrolidinetetrazole; (2S)-1-(1,2-dioxo-3,3-dimethylpentyl)-2-pyrrolidinecarbonitrile; and (2S)-1-(1,2-dioxo-3,3-dimethylpentyl)-2-aminocarbonyl piperidine; and compounds 1-25, 27, 28, 31-33, and 35-136 of Tables I, II, and III.

6. The compound 1-{2-[3-(4-Fluorophenyl)(1,2,4-oxadiazol-5-yl)]pyrrolidinyl}-3,3-di-methylpentane-1,2-dione.

7. The compound 3,3-Dimehyl-1-[2-(3-methyl(1,2,4-oxadiazol-5-yl))pyrrolidinyl]pentane-1,2-dione.

8. A pharmaceutical composition, comprising:
a) an effective amount of an N-heterocyclic carboxylic acid or carboxylic acid isostere; and
b) a pharmaceutically acceptable carrier.

9. The pharmaceutical composition of claim 8, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere comprises a compound of formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl or alkenyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is carboxylic acid or a carboxylic acid isostere;

and

wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, or heterocycle is optionally substituted with one or more substituents selected from R^3, where

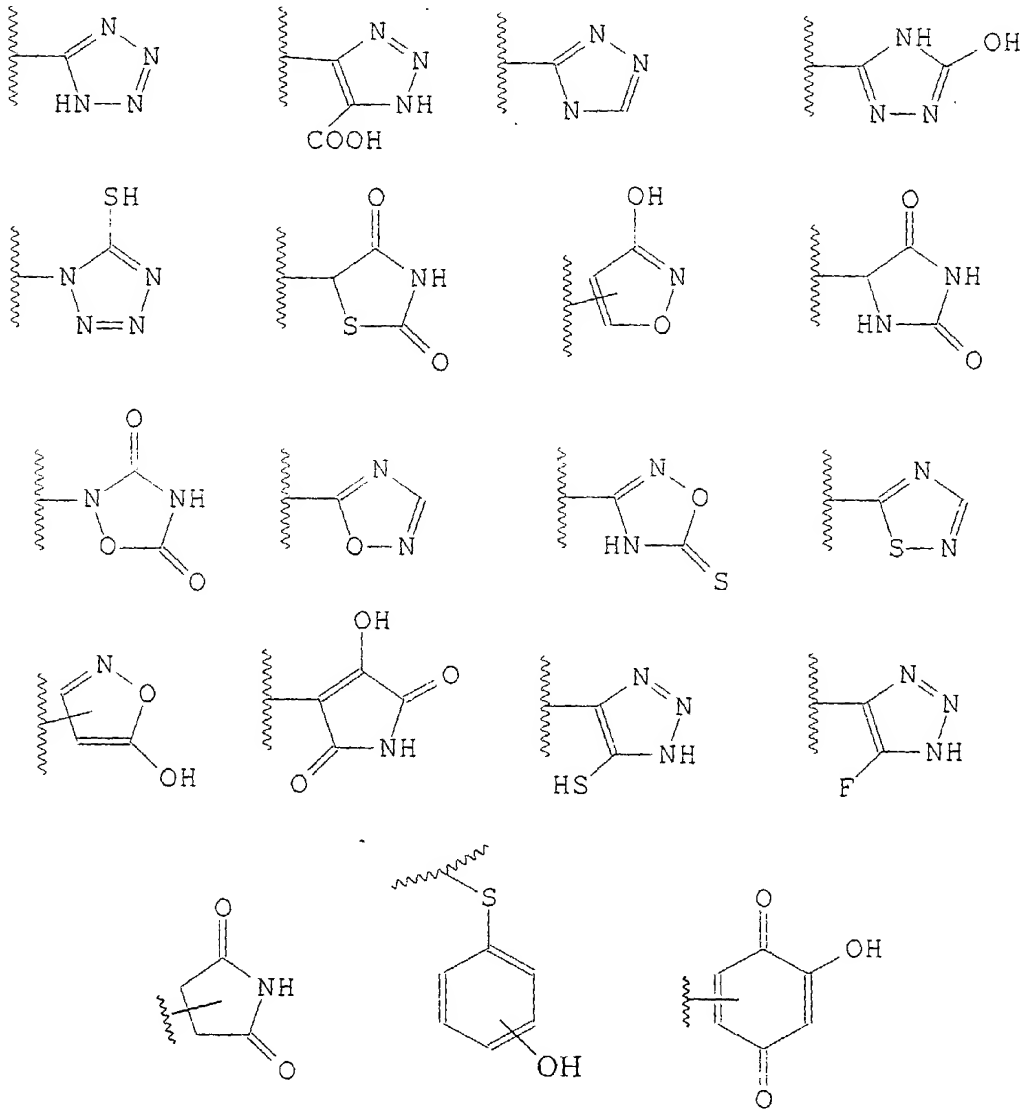
R^3 is hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, and CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate thereof.

10. The pharmaceutical composition of claim 9, wherein R_2 is

a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

11. The pharmaceutical composition of claim 9, wherein R_2 is selected from the following group:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

12. The pharmaceutical composition of claim 9, wherein R_2 is selected from the group consisting of:
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_3(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CON(R^3)_2$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$..

13. The pharmaceutical composition of claim 9, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere compound is selected from the group consisting of compounds 1-139.

14. The pharmaceutical composition of claim 8, further comprising a neurotrophic factor different from formula (I).

15. The pharmaceutical composition of claim 14, wherein said neurotrophic factor different from formula (I) is selected from neurotrophic growth factor, brain derived growth factor, glial derived growth factor, cilial neurotrophic factor, insulin growth factor and active truncated derivatives thereof, acidic fibroblast growth factor, basic fibroblast growth factor, platelet-derived growth factors, neurotropin-3 and neurotropin 4/5.

16. A method of treating a neurological disorder in an animal, comprising:

administering to the animal an effective amount of an N-heterocyclic carboxylic acid or carboxylic acid isostere to stimulate growth of damaged peripheral nerves or to promote neuronal regeneration.

17. The method of claim 16, wherein the neurological disorder is selected from the group consisting of peripheral

neuropathies cause by physical injury or disease state, physical damage to the brain, physical damage to the spinal cord, stroke associated with brain damage, and neurological disorders relating to neurodegeneration.

18. The method of claim 16, wherein the neurological disorder is selected from the group consisting of Alzheimer's Disease, Parkinson's Disease, amyotrophic lateral sclerosis, and Huntington's Disease.

19. The method of claim 16, wherein the neurological disorder is Alzheimer's disease.

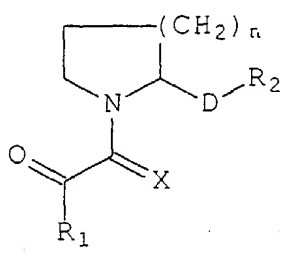
20. The method of claim 16, wherein the neurological disorder is Parkinson's disease.

21. The method of claim 16, wherein the neurological disorder is amyotrophic lateral sclerosis.

22. The method of claim 16, wherein the neurological disorder is Huntington's disease.

23. The method of claim 16, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere is non-immunosuppressive.

24. The method of claim 16, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere comprises a compound of formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl or alkenyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is carboxylic acid or a carboxylic acid isostere; and

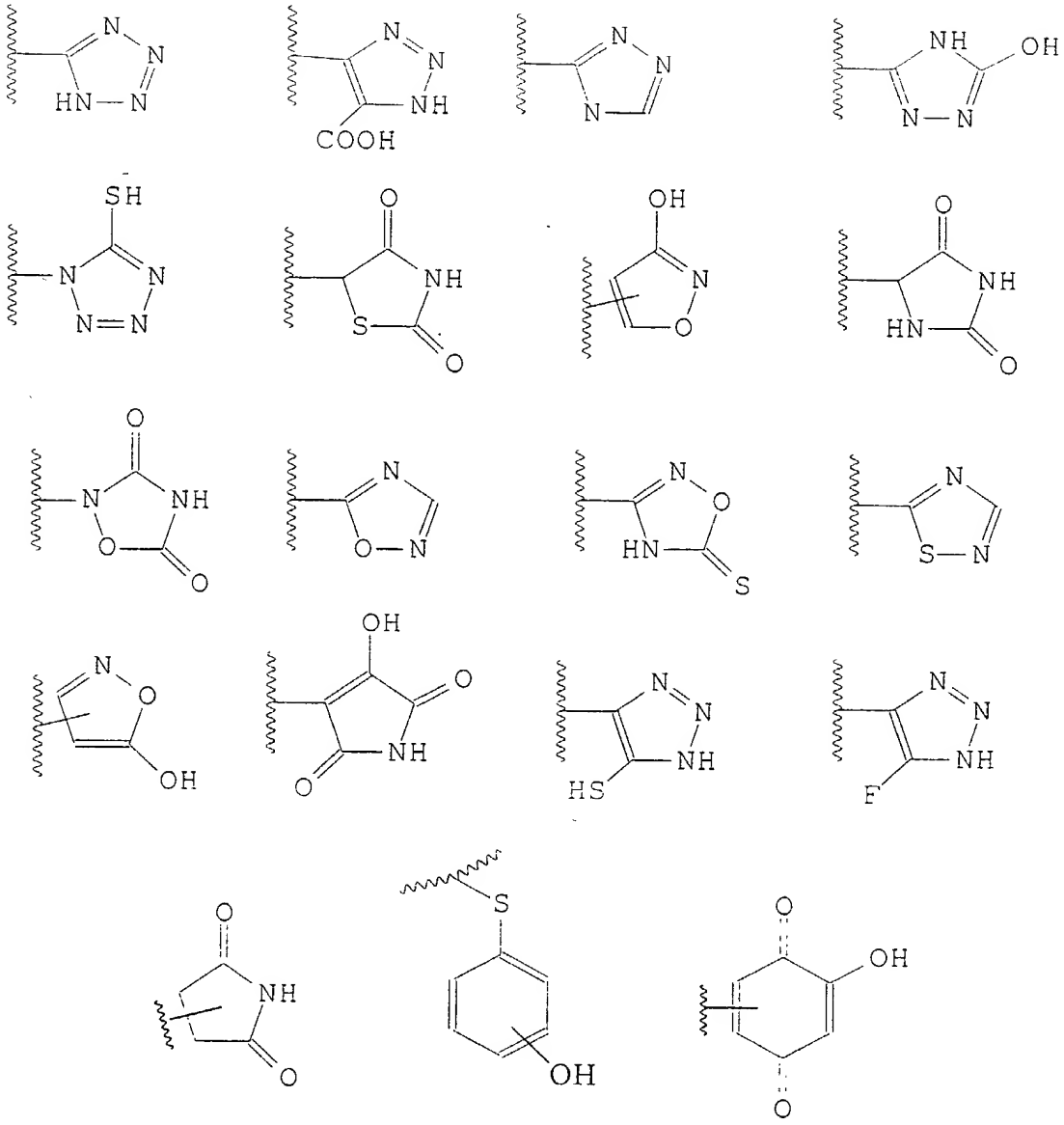
wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, or heterocycle is optionally substituted with one or more substituents selected from R^3, where

R^3 is hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, and CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate thereof.

25. The method of claim 24, wherein R_2 is a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

26. The method of claim 24, wherein R_2 is selected from the following group:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

27. The method of claim 24, wherein R_2 is selected from the group consisting of:
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_2(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CON(R^3)_2$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$.

28. The method of claim 16, wherein the N-heterocyclic carboxylic acid or caroboxylic acid isostere compound is selected from the group consisting of compounds 1-139.

29. The method of claim 16, further comprising administering a neurotrophic factor different from formula (I).

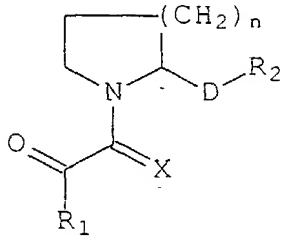
30. The method of claim 29, wherein said neurotrophic factor different from formula (I) is selected from the group consisting of neurotrophic growth factor, brain derived growth factor, glial derived growth factor, cilial neurotrophic factor, insulin growth factor and active truncated derivatives thereof, acidic fibroblast growth factor, basic fibroblast growth factor, platelet-derived growth factors, neurotropin-3, and neurotropin 4/5.

31. A method of stimulating growth of damaged peripheral nerves, comprising:

administering to damaged peripheral nerves an effective amount of an N-heterocyclic carboxylic acid or carboxylic acid isostere to stimulate or promote growth of the damaged peripheral nerves.

32. The method of claim 31, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere is non-immunosuppressive.

33. The method of claim 31, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere comprises a compound of formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl or alkenyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is carboxylic acid or a carboxylic acid isostere; and

wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, or heterocycle is optionally substituted with one or more substituents selected from R^3, where

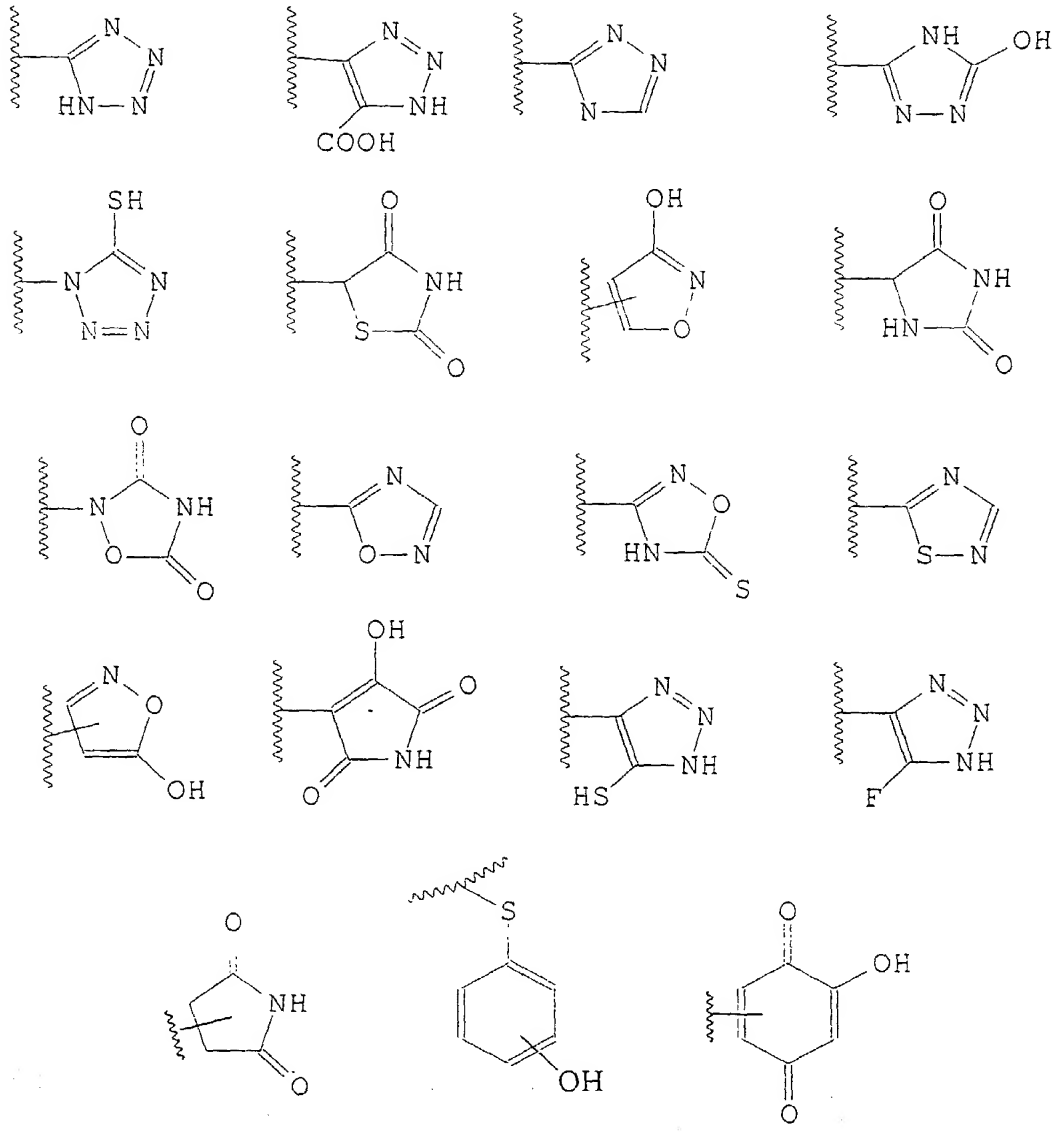
R^3 is hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, and CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate

thereof.

34. The method of claim 33, wherein R_2 is a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

35. The method of claim 33, wherein R_2 is selected from the following group:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

36. The method of claim 33, wherein R_2 is selected from the group consisting of:
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_3(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CON(R^3)_2$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$.

37. The method of claim 31, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere compound is selected from the group consisting of compounds 1-139.

38. The method of claim 31, further comprising administering a neurotrophic factor different from formula (I).

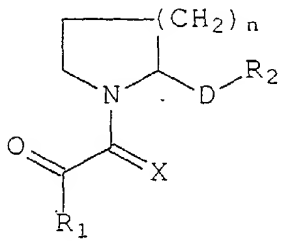
39. The method of claim 38, wherein said neurotrophic factor different from formula (I) is selected from the group consisting of neurotrophic growth factor, brain derived growth factor, glial derived growth factor, cilial neurotrophic factor, insulin growth factor and active truncated derivatives thereof, acidic fibroblast growth factor, basic fibroblast growth factor, platelet-derived growth factors, neurotropin-3, and neurotropin 4/5.

40. A method for promoting neuronal regeneration and growth in animals, comprising:

administering to an animal an effective amount of a N-heterocyclic carboxylic acid or carboxylic acid isostere to promote neuronal regeneration.

41. The method of claim 40, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere is non-immunosuppressive.

42. The method of claim 40, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere comprises a compound of formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl or alkenyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is carboxylic acid or a carboxylic acid isostere; and

wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, or heterocycle is optionally substituted with one or more substituents selected from R^3, where

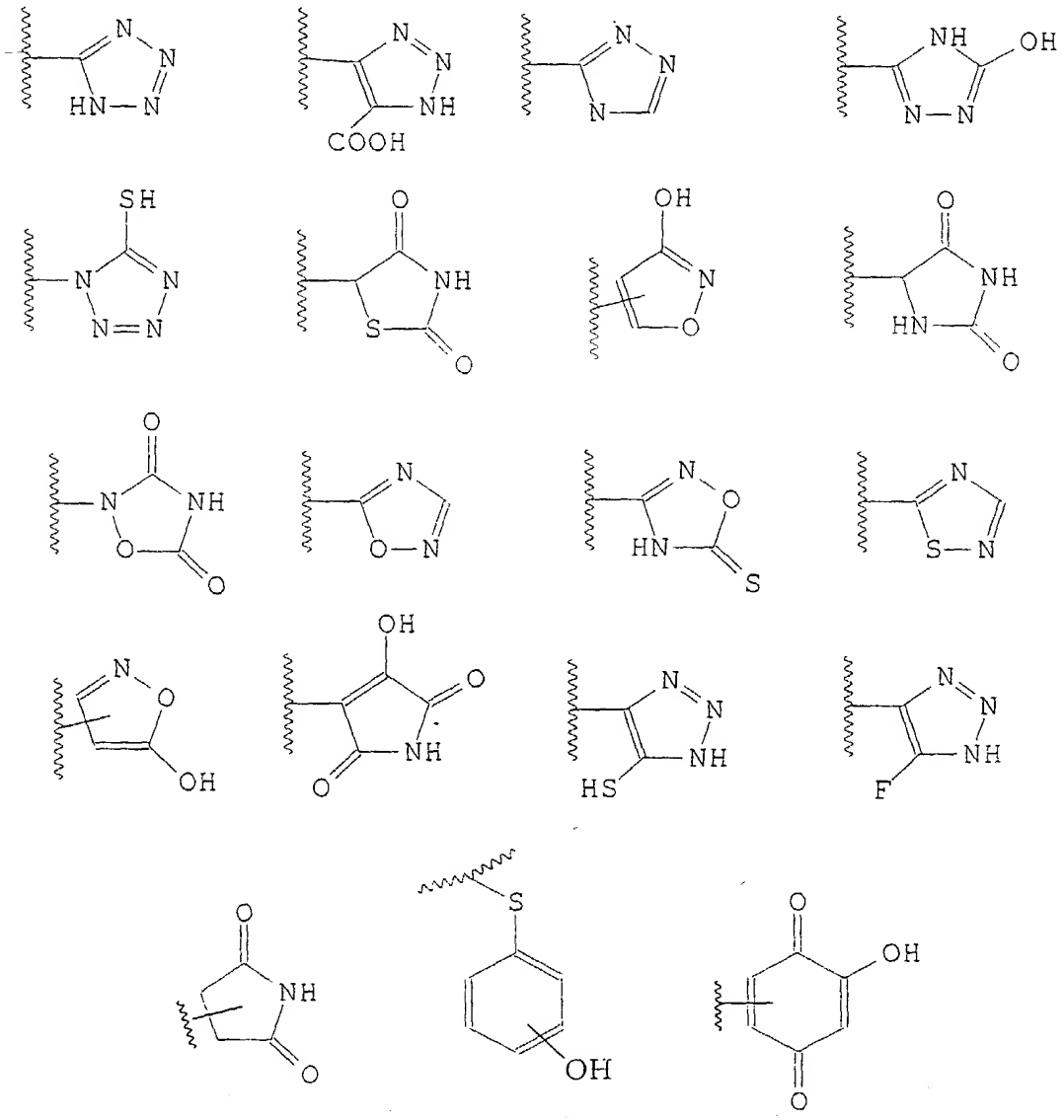
R^3 is hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, and CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate

thereof.

43. The method of claim 42, wherein R_2 is a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

44. The method of claim 42, wherein R_2 is selected from the following group:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

45. The method of claim 42, wherein R_2 is selected from the group consisting of:
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_3(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CON(R^3)_2$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$.

46. The method of claim 40, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere compound is selected from the group consisting of compounds 1-139.

47. The method of claim 40, further comprising administering a neurotrophic factor different from formula (I).

48. The method of claim 47, wherein said neurotrophic factor different from formula (I) is selected from the group consisting of neurotrophic growth factor, brain derived growth factor, glial derived growth factor, cilial neurotrophic factor, insulin growth factor and active truncated derivatives thereof, acidic fibroblast growth factor, basic fibroblast growth factor, platelet-derived growth factors, neurotropin-3, and neurotropin 4/5.

49. A method for preventing neurodegeneration in an animal, comprising:

administering to an animal an effective amount of a N-heterocyclic carboxylic acid or carboxylic acid isostere to prevent neurodegeneration.

50. The method of claim 49, wherein the neurodegeneration is Alzheimer's disease.

51. The method of claim 49, wherein the neurodegeneration

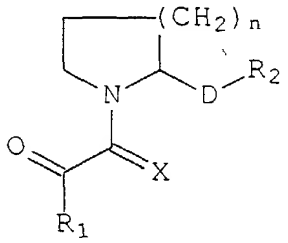
is Parkinson's disease.

52. The method of claim 49, wherein the neurodegeneration is amyotrophic lateral sclerosis.

53. The method of claim 49, wherein the neurodegeneration is Huntington's Disease.

54. The method of claim 49, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere is non-immunosuppressive.

55. The method of claim 49, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere comprises a compound of formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl or alkenyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is carboxylic acid or a carboxylic acid isostere; and

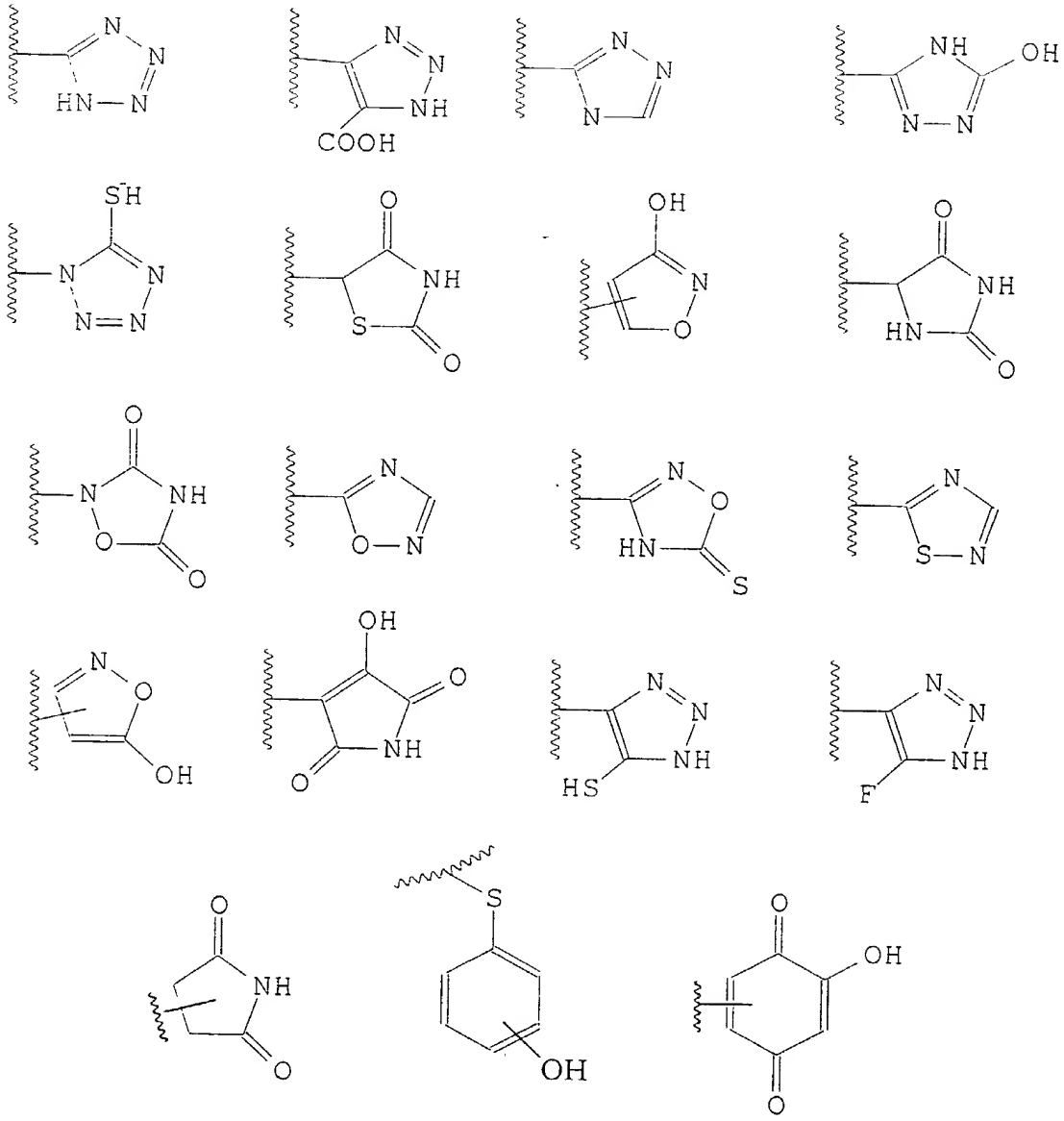
wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, or heterocycle is optionally substituted with one or more substituents selected from R^3, where

R^3 is hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, and CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate thereof.

56. The method of claim 55, wherein R_2 is a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

57. The method of claim 55, wherein R_2 is selected from the following group:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

58. The method of claim 55, wherein R_2 is selected from the group consisting of:
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_3(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CON(R^3)_2$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$.

59. The method of claim 49, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere compound is selected from the group consisting of compounds 1-139.

60. The method of claim 49, further comprising administering a neurotrophic factor different from formula (I).

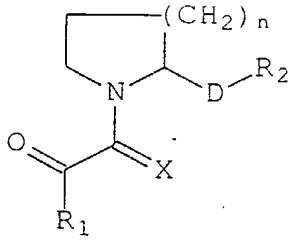
61. The method of claim 60, wherein said neurotrophic factor different from formula (I) is selected from the group consisting of neurotrophic growth factor, brain derived growth factor, glial derived growth factor, cilial neurotrophic factor, insulin growth factor and active truncated derivatives thereof, acidic fibroblast growth factor, basic fibroblast growth factor, platelet-derived growth factors, neurotropin-3, and neurotropin 4/5.

62. A method for treating alopecia or promoting hair growth in an animal, which comprises administering to said animal an effective amount of an N-heterocyclic carboxylic acid or carboxylic acid isostere.

63. The method of claim 62, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere is non-immunosuppressive.

64. The method of claim 62, wherein the N-heterocyclic

carboxylic acid or carboxylic acid isostere is a compound of formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl or alkenyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is carboxylic acid or a carboxylic acid isostere; and

wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, heterocycle, or carboxylic acid isostere is optionally substituted with one or more substituents selected from R^3, where

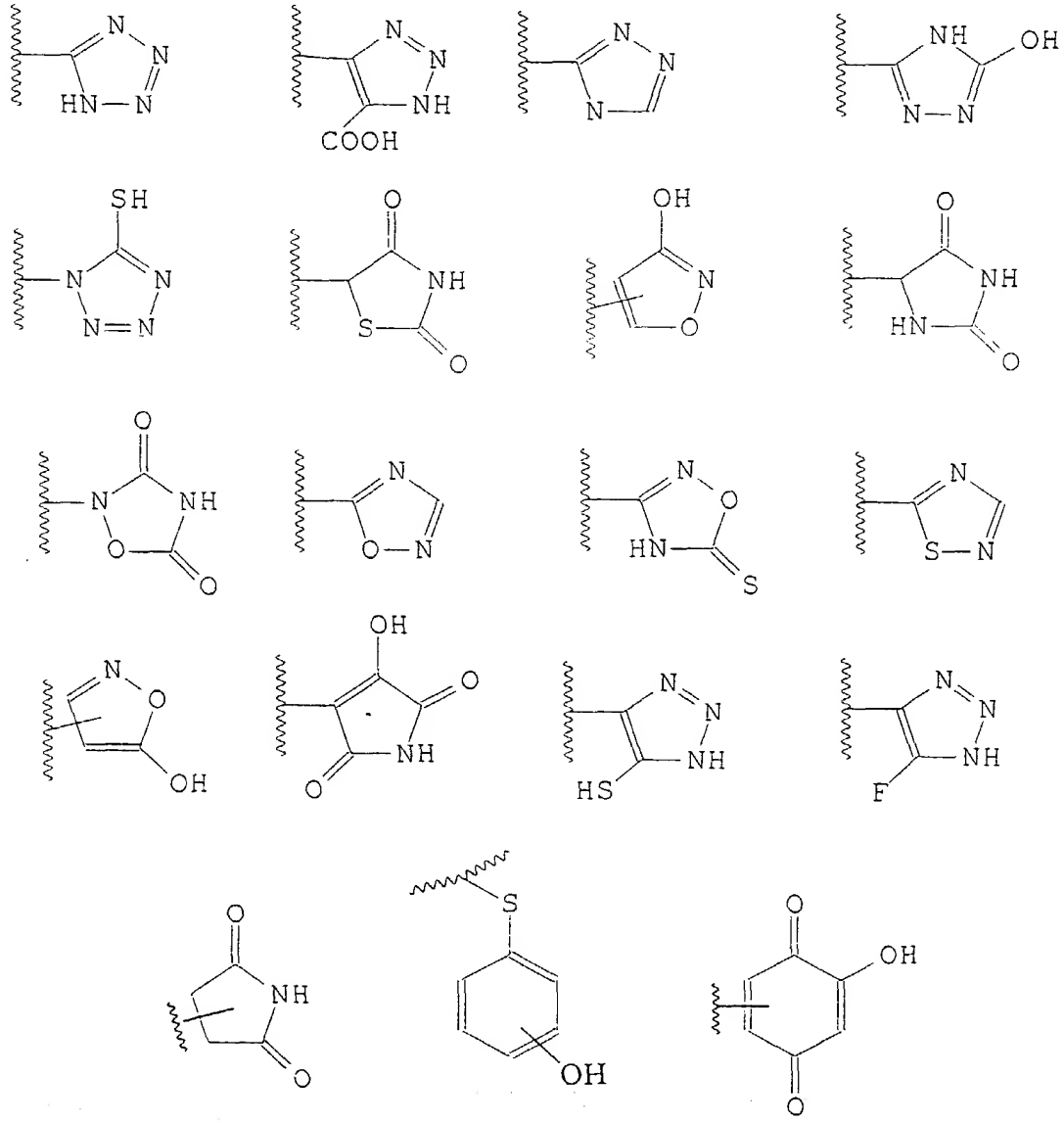
R^3 is hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, and CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate

thereof.

65. The method of claim 64, wherein R_2 is a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

66. The method of claim 64, wherein R_2 is selected from the following group:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

67. The method of claim 64, wherein R_2 is selected from the group consisting of
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_3(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CON(R^3)_2$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$.

68. The method of claim 62, wherein the carboxylic acid or carboxylic acid isostere is selected from the group consisting of compounds 1-139.

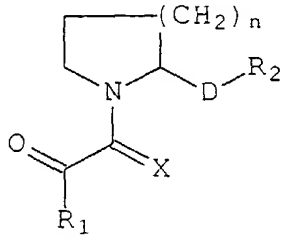
69. A pharmaceutical composition comprising:

(i) an effective amount of a N-heterocyclic carboxylic acid or carboxylic acid isostere for treating alopecia or promoting hair growth in an animal; and

(ii) a pharmaceutically acceptable carrier.

70. The pharmaceutical composition of claim 69, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere is non-immunosuppressive.

71. The composition of claim 69, wherein the carboxylic acid or carboxylic acid isostere is a compound of formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl or alkenyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is carboxylic acid or a carboxylic acid isostere; and

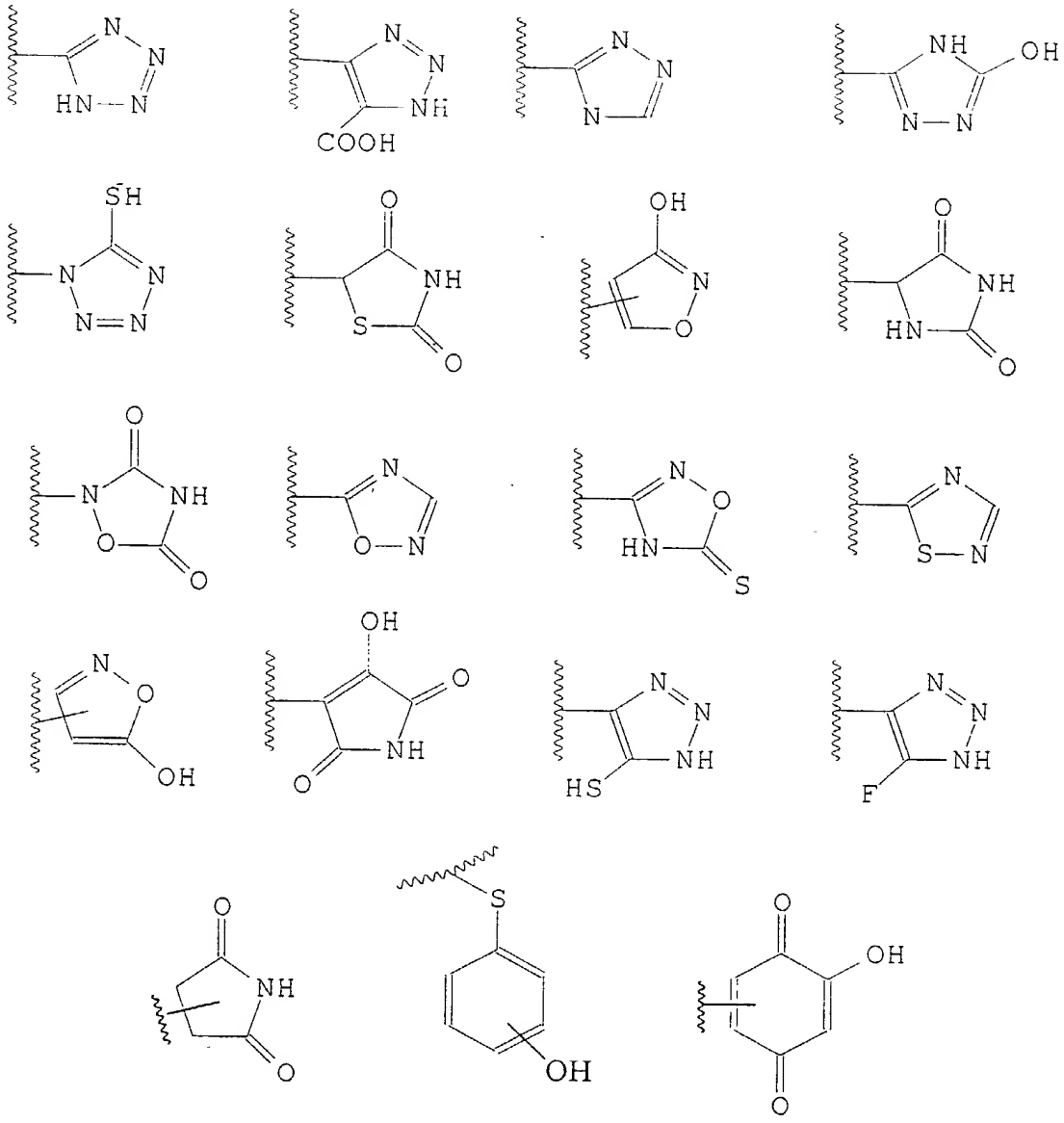
wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, heterocycle, or carboxylic acid isostere is optionally substituted with one or more substituents selected from R^3, where

R^3 is hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, and CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate thereof.

72. The composition of claim 71, wherein R_2 is a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

73. The composition of claim 71, wherein R_2 is selected from the following group:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

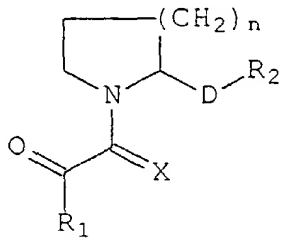
74. The composition of claim 71, wherein R_2 is selected from the group consisting of:
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_3(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CON(R^3)_2$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$.

75. The composition of claim 69, wherein the carboxylic acid or carboxylic acid isostere is selected from the group consisting of compounds 1-139.

76. A method for treating a vision disorder, improving vision, treating memory impairment, or enhancing memory performance in an animal, which comprises administering to said animal an effective amount of an N-heterocyclic carboxylic acid or carboxylic acid isostere.

77. The method of claim 76, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere is non-immunosuppressive.

78. The method of claim 76, wherein the N-heterocyclic carboxylic acid or carboxylic acid isostere is a compound of formula (I):



I

where

n is 1-3;

X is either O or S;

R_1 is selected from the group consisting of C_1-C_9 straight or branched chain alkyl or alkenyl, C_2-C_9 straight or branched chain alkenyl, aryl, heteroaryl, carbocycle, or heterocycle;

D is a bond, or a C_1-C_{10} straight or branched chain alkyl, C_2-C_{10} alkenyl or C_2-C_{10} alkynyl;

R_2 is carboxylic acid or a carboxylic acid isostere; and

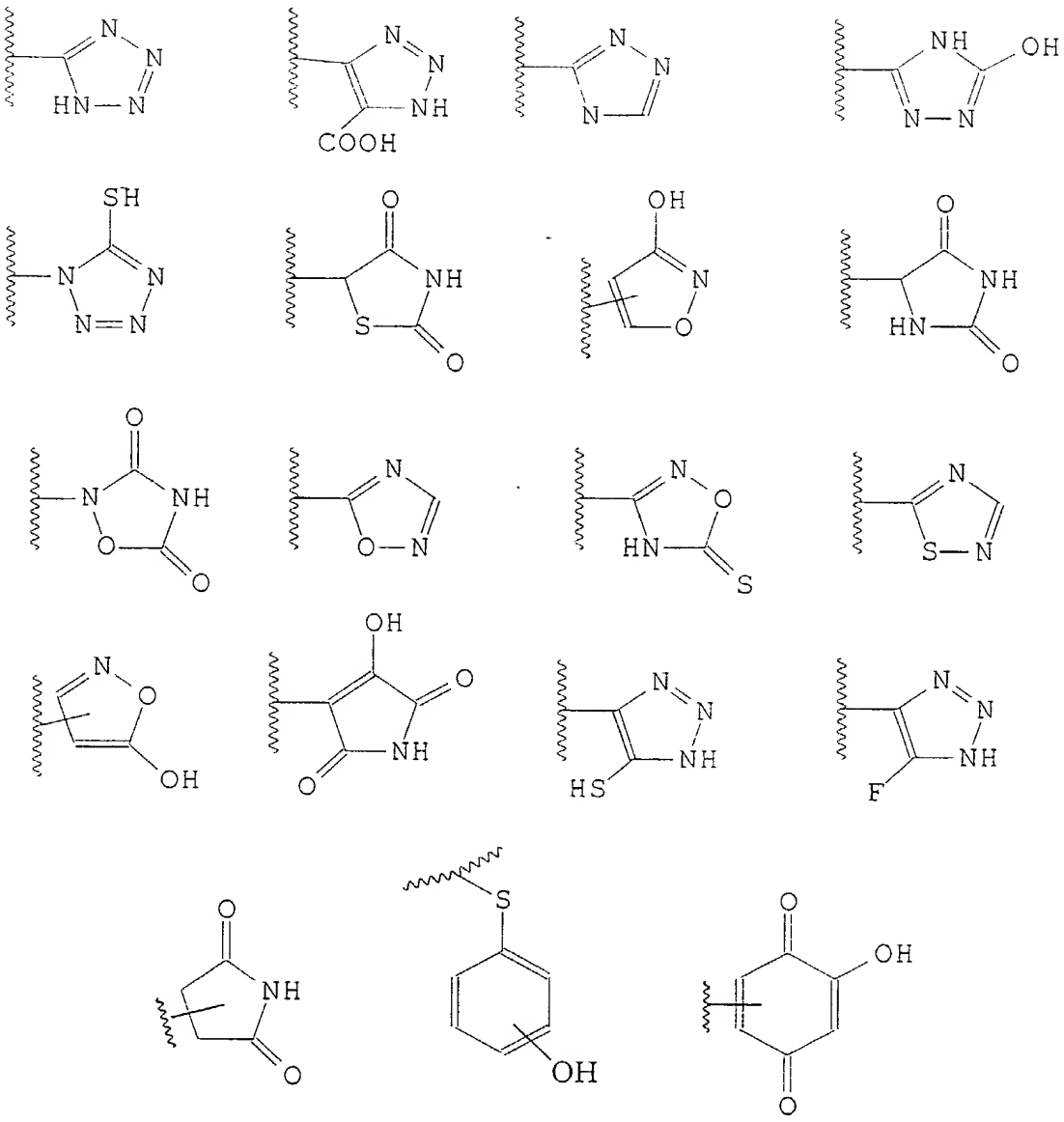
wherein said alkyl, alkenyl, alkynyl, aryl, heteroaryl, carbocycle, heterocycle, or carboxylic acid isostere is optionally substituted with one or more substituents selected from R^3, where

R^3 is hydrogen, hydroxy, halo, haloalkyl, thiocarbonyl, alkoxy, alkenoxy, alkylaryloxy, aryloxy, arylalkyloxy, cyano, nitro, imino, alkylamino, aminoalkyl, sulfhydryl, thioalkyl, alkylthio, sulfonyl, C_1-C_6 straight or branched chain alkyl, C_2-C_6 straight or branched chain alkenyl or alkynyl, aryl, aralkyl, heteroaryl, carbocycle, heterocycle, and CO_2R^7 where R^7 is hydrogen or C_1-C_9 straight or branched chain alkyl or C_2-C_9 straight or branched chain alkenyl;

or a pharmaceutically acceptable salt, ester, or solvate thereof.

79. The method of claim 78, wherein R_2 is a carbocycle or heterocycle containing any combination of CH_2, O, S, or N in any chemically stable oxidation state, wherein any of the atoms of said ring structure are optionally substituted in one or more positions with R^3.

80. The method of claim 78, wherein R_2 is selected from the following group:



where the atoms of said ring structure may be optionally substituted at one or more positions with R^3.

81. The method of claim 78, wherein R_2 is selected from the group consisting of
$-COOH$; $-SO_3H$,; $-SO_2HNR^3$; $-PO_2(R^3)_2$; $-CN$; $-PO_3(R^3)_2$; $-OR^3$; $-SR^3$; $-NHCOR^3$; $-N(R^3)_2$; $-CON(R^3)_2$; $-CONH(O)R^3$; $-CONHNHSO_2R^3$; $-COHNSO_2R^3$; and $-CONR^3CN$.

82. The method of claim 76, wherein the carboxylic acid or carboxylic acid isostere is selected from the group consisting of compounds 1-139.